

CLAIMS

What is claimed is:

- 5 1. Apparatus for securing a hub to a shaft, comprising:
- a) a cylindrical shaft having at least one longitudinal keyway formed in an outer surface thereof, said at least one keyway having a bottom surface;
- b) a hub having an axial bore defining a wall in said hub and being disposable on said shaft to define a maximum distance from said keyway bottom surface to said
10 bore wall; and
- c) at least one tapered locking key for insertion into said at least one keyway between said keyway bottom and said bore wall, said key having a pre-insertion maximum height greater than said maximum distance such that at least one of said key and said hub is deformed by said insertion, whereby said hub is rotationally and axially
15 secured onto said shaft.
2. An apparatus in accordance with Claim 1 wherein said hub is formed of a deformable polymer having a first hardness.
- 20 3. An apparatus in accordance with Claim 2 wherein said key is formed of a material selected from the group consisting of metal, mineral-filled polymer, glass, ceramic, and combinations thereof.

4. An apparatus in accordance with Claim 2 wherein said key has a second hardness greater than said first hardness.

5. An apparatus in accordance with Claim 1 wherein said at least one locking key is an end key in a chain of connected keys, said end key being severable from said chain after insertion of said at least one key into said at least one keyway.

6. An apparatus in accordance with Claim 1 wherein said shaft is a throttle shaft and said hub is a portion of a shaft rotary position sensor.

7. A method for securing a hub having an axial bore defined by a bore wall onto a cylindrical shaft, comprising the steps of:

- a) providing at least one longitudinal keyway in said shaft, said at least one keyway having a bottom surface;
- b) disposing said axial bore of said hub onto said shaft to define a maximum distance between said keyway bottom surface and said bore wall;
- c) providing at least one wedging means; and
- d) inserting said at least one wedging means into said at least one keyway between said keyway bottom surface and said bore wall.

8. A method in accordance with Claim 7 wherein said at least one wedging means is at least one locking key having a maximum height greater than said maximum distance.

9. A method in accordance with Claim 8 further comprising the step of advancing said at least one locking key into said at least one keyway until the point of said maximum height is axially centered within said hub bore.

5 10. A method for fixedly indexing a calibrated throttle valve, having a rotatable throttle shaft, to the swing arm of a calibrated position sensor for an internal combustion engine, comprising the steps of:

a) providing at least one longitudinal keyway in said shaft, said at least one keyway having a bottom surface;

10 b) providing a hub on said swing arm, said hub having an axial bore having an axis orthogonal to the direction of motion of said swing arm, said bore having a wall;

c) disposing said axial bore of said hub rotatably onto said shaft to define a maximum distance between said keyway bottom surface and said bore wall;

15 d) rotating said shaft within said bore to a desired calibrating orientation of said throttle shaft;

e) rotating said hub about said shaft to a desired calibrating orientation of said swing arm;

f) providing at least one wedging means; and

20 g) after said steps d) and e), inserting said at least one wedging means into said keyway between said keyway bottom surface and said bore wall to immobilize said hub on said shaft with said swing arm indexed to said shaft.

11. A method in accordance with Claim 10 further comprising the step of

advancing said at least one wedging means into said at least one keyway until the highest point of said at least one wedging means is axially centered within said hub bore.

12. A method in accordance with Claim 10 wherein said step of providing at least one longitudinal keyway in said shaft includes the further step of selecting a circumferential position on said shaft for said at least one keyway such that said at least one keyway is oriented about 180° away from the attachment point of said swing arm to said hub when said hub is immobilized on said shaft.

13. Apparatus for securing a hub to a shaft, comprising:

a) a cylindrical shaft having an outer surface;

b) a hub having an axial bore defining a wall in said hub and having at least one longitudinal keyway formed in an inner surface thereof, said at least one keyway having a bottom surface, said hub being disposable on said shaft to define a maximum distance from said keyway bottom surface to said outer surface; and

c) at least one tapered locking key for insertion into said at least one keyway between said keyway bottom and said shaft surface, said at least one key having a pre-insertion maximum height greater than said maximum distance such that at least one of said key and said shaft is deformed by said insertion, whereby said hub is rotationally and axially secured onto said shaft.